DOCUMENT RESUME

ED 050 314 AC 010 191

AUTHOR	McFann, Howard H.
TITLE	HumRRO Research and Project 100,000.
INSTITUTION	Human Resources Research Organization, Alexandria, Va.
REPORT NO	Prof-P-33-70
PUB DATE	Dec 70
NOTE	9p.; Paper presented at American Psychological Association Convention (Miami Beach, Florida, September 1970)
EDRS PRICE	EDRS Price MF-$0.65 HC-$3.29
DESCRIPTORS	*Individual Differences, *Literacy, Models, *Training Techniques
IDENTIFIERS	Project 100,000

ABSTRACT

This paper was part of a symposium in which research on Project 100,000 was summarized. The report presents information on three major HumRRO projects concerned with training and performance of men of varying ability levels. The first project compared on-the-job performance of military personnel of varying ability levels. The second project concentrated on literacy requirements for military jobs. The third project concerned developing and testing, in an operational context, instructional programs appropriate for simultaneously training men of various ability levels. (Author)

ED050314

F-DOD

Professional Paper 33-70
December 1970 AC

HumRRO Research and Project 100,000

by

Howard H. McFann

Symposium Presentation at the
American Psychological Association
Convention
Miami Beach, Florida September 1970

U.S. DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
OFFICE OF EDUCATION
THIS DOCUMENT HAS BEEH REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL OFFICE OF EDUCATION POSITION OR POLICY.

Approved for
public release;
distribution
unlimited.

HumRRO

HUMAN RESOURCES RESEARCH ORGANIZATION

AC010191

The Human Resources Research Organization (HumRRO) is a nonprofit corporation established in 1969 to conduct research in the field of training and education. It is a continuation of The George Washington University Human Resources Research Office. HumRRO's general purpose is to improve human performance, particularly in organizational settings, through behavioral and social science research, development, and consultation. HumRRO's mission in work performed under contract with the Department of the Army is to conduct research in the fields of training, motivation and leadership.

The contents of this paper are not to be construed as an official Department of the Army position, unless so designated by other authorized documents.

Published
December 1970
by
HUMAN RESOURCES RESEARCH ORGANIZATION
300 North Washington Stree
Alexandria, Virginia 22314

ED050314

Prefatory Note

This paper was presented at the 1970 American Psychological Association convention, as part of a symposium in which research on Project 100,000 was summarized.

The research efforts described in this paper were accomplished at Human Resources Research Organization, Division No. 3 at Monterey, California, under Department of the Army contract. The paper summarizes and presents findings in three major Work Units: UTILITY, Study of Soldiers in Lower Mental Categories: Job Performance and the Identification of Potentially Successful and Potentially Unsuccessful Men; REALISTIC, Determination of Reading, Listening, and Arithmetic Skills Required for Major Military Occupational Specialties; and APSTRAT, Training Strategies and Incentives Appropriate to Different Aptitude Levels for Selected Army Training Courses.

HumRRO RESEARCH AND PROJECT 100,000

Howard H. McFann

The object of this paper is to summarize three different HumRRO research efforts which we have had underway for the past two years. Each of these efforts is part of our research which bears on the Project 100,000 program.

The first effort, Work Unit UTILITY, has been concerned with obtaining systematic information on the direct measurement of job behavior. The study was designed to compare the job performance of men at different ability levels, as determined by the Armed Forces Qualification Test (AFQT) score, and to map the manner in which their performance changes as a function of the length of time they have been in their jobs. Since there is evidence that many men who are labeled as low aptitude personnel do perform effectively, the study also aimed at identifying those personal and background characteristics that might distinguish more effective marginal individuals.

The data collection has been completed and some of the data analyzed. After a brief description of the jobs and the design of our research, a sample of the performance data will be presented to give an idea of the nature of the research and the type of information generated.

We chose to study men from different entry level Army jobs, specifically Tank Crewman, Vehicle Repairman or Mechanic, Supply Clerk, and Cook jobs. In addition to choosing Army jobs which were highly populated overall as well as with low aptitude men, we selected jobs to represent a fairly broad range of job types and task complexities and with the exception of one job, each had a civilian counterpart.

The Tank Crewman job can be described as a machine-ascendant system principally consisting of sequences of interaction between the man and equipment with tasks that are largely procedural. The Mechanic is a maintenance job that requires diagnostic and interpretative skills. The Supply Clerk job is clerical in nature, calling primarly for the coordination and recording of information. The Cook job calls for preparation of food in accordance with a master menu and detailed recipes. Primarily the job involves recognition of standards and precision in meeting them.

In selecting the test sample, particular care was taken to ensure that all men in the test sample were working on a continuous daily basis in operational units. To ensure a sizable low aptitude sample, pairs of men were selected within each unit tested. Each pair included one man with an AFQT or percentile score between 1-30 and one man with a score between 31-99. Pair members were carefully matched for the amount of time they had been in their jobs. Approximately 200 men were tested in each job for a total sample of about 1600 people.

Performance was measured by using job sample tests, conventional multiple choice knowledge tests, and supervisor ratings. Since supervisor ratings failed to be discriminating, we will only observe that, clearly, what one concludes about performance depends to a considerable extent upon the criteria selected for measurement.

Since the primary criteria were the job or work sample tests and because they represent a fairly unique contribution, I will briefly describe the nature of these tests before presenting some findings. Depending upon the job, each individually administered job sample test took anywhere from 3½ to 5 hours. Each job sample test was comprised of a number of subtests, with each subtest consisting of the performance of an entire

task with a natural beginning and end. Items were selected on the basis of criticality, frequency of occurrence, and representativeness of the job. Subjects were presented with subtest tasks or problems to solve just as they might encounter them on the job. Subjects earned a point for the correct performance of each step of a subtest. For example, one of the Mechanic subtests, which consisted of 19 steps, involved the diagnosis and correction of a leaking oil seal. The vehicle was prepared so that the oil seals were leaking and the subject was told that oil was being thrown out of the grill doors. He was to locate the source of the oil leak and repair the malfunction. Specially trained administrators were employed throughout the testing. The subject had the necessary equipment, such as manuals and tools, that would be available on the job and was given ample time to perform the task.

Some of the major findings and conclusions of the research to date are:

(1) As judged by the work sample tests, performance in all jobs improves both as a function of AFQT level and with increasing time on the job. The general pattern of development is pretty much the same in each job. On the jobs studied, the aptitude groups converge after about 2½ to 5 years depending upon the job.

(2) Job knowledge varies and grows as a function of AFQT and time on job similar to work sample performance. This lack of convergence probably reflects that with the job knowledge tests it was possible to sample a broader range of job information as well as to tap for information which is less frequently demanded hence more incidental in nature.

(3) The amount of job experience a man has is more highly related than his AFQT to both his level of job performance (job sample scores) and the amount of information he possesses about his job (job knowledge scores).

(4) Although the difference between Negroes and Caucasians on the AFQT test was about 18 points, they performed equally well on the job sample and job knowledge tests.

Although the data analysis is still underway, the study is providing valuable and sorely needed information.

The second research effort I will describe also is concerned with job performance and also is nearing completion. It was anticipated that with the advent of Project 100,000 there would be an influx of many men of marginal literacy into the services. This was confirmed by statistics (1968) which indicated that 31% of a sample of 46,000 Project 100,000 men read at or below the fourth grade level of ability, and some 68% read at or below the sixth grade level of ability. Because of the low reading skills of many of these men, there was concern among manpower specialists that many of them might be assigned to jobs where the demands for reading skills might far exceed the ability of the men and possibly lead to job failure. To reduce this possibility, information about the literacy demands of military jobs was needed. Project REALISTIC, which is an acronym based upon the literacy skill areas studied, REAding, LIStening, and ArithmeTIC, was initiated to (a) provide information concerning the demand for reading, listening, and arithmetic skills in several major military jobs, and (b) provide information and suggestions for reducing discrepancies between personal literacy skill levels and the literacy skill levels required by the job.

To examine literacy job requirements, data were obtained to determine the relationship among reading, listening, and arithmetic skills of job incumbents and their performance on different indices of job proficiency.

The proficiency indices include proficiency on job-related reading tasks, proficiency on "hands-on" job sample performance tests, proficiency on job knowledge (paper-and-pencil) tests, and proficiency as evidenced by supervisor ratings. These activities have also provided information concerning the way a man's reading ability interacts with the reading difficulty level of job reading materials to influence the extent of usage of job reading materials.

Another aspect of this research has involved obtaining information that might be useful for suggesting ways to reduce gaps between an individual's literacy skill level and the demands for these skills. We have considered reducing discrepancies between the skills people have and the skills needed for the job by either modifying the person's behavior through literacy training or by modifying the job demands. In the latter case, we have considered the substitution of listening for reading demands, and the redesign of job and training aids to make them less demanding of literacy skills.

Some of our major findings are:

(1) The reading difficulty levels of much of the job material does exceed the reading ability of many job incumbents. The extent of the discrepancy is related to the particular job. For example, the reading materials for the mechanic and supply jobs exceeded the average reading ability levels of Non-Category IV men by some four to six grade levels and exceeded the reading levels of Category IV men by some six to eight grade levels. However, the reading materials used by cooks, which consist primarily of menus, were written at a grade level comparable to the reading ability level of most job incumbents. Further, indications are that much of the material could be redesigned to make it easier to use and comprehend.

(2) As expected, we found that the use of printed materials increased with increased skill in reading, and that the easier the printed material, the more it was likely to be used. When the material was difficult, the poorer reader relied heavily on listening and asking questions to obtain information. When the printed material was consistent with his capability, the poorer reader did use it. Thus, increased use of reading materials might be accomplished both by redesign of materials and by remedial training in literacy. Our data suggest that immediate greater gains in use of printed material might be expected from the redesign of materials than from increasing the literacy skills of men.

(3) As a result of comparing the relationships of reading ability to job knowledge and job performance tests, it appears that, if reading scores are to be used for selection as cut-off or remedial training criterion, at least seventh grade level should be sought.

(4) For arithmetic, for selection or remedial training purposes, a fifth to sixth grade level would seem sufficient for successful job performance in the high density low demand jobs.

The third and last research activity described in this paper, APSTRAT, also initiated in April 1968, has as its objective the formulation of a strategy of instruction capable of effective and efficient training of large groups of men with widely varying aptitudes. We believe the model has direct application on a broad scale, particularly in the fields of basic vocational education and on-the-job vocational training and retraining. The model emphasizes peer instruction in an on-the-job functional context and utilizes the following strategies:

(1) Performance orientation.
(2) Self-paced training.
(3) Insistence on mastery.
(4) Rapid and detailed feedback to trainees as to the adequacy of their learning.
(5) Rapid and detailed feedback to the trainer as to the adequacy of instruction.
(6) Functional context.

In addition to the basic strategies just mentioned, development of the model was shaped by a set of practical constraints:

(1) Simulated on-the-job training.
(2) No significant increase in instructor personnel.

(3) No lengthening of the course time but with meaningful utilization of the accelerated learner.
(4) No excess demands on the system in terms of instructional hardware or operational equipment.
(5) Little or no use of elaborate instructional software.
(6) No reduction of trainee output in terms of numbers, level of proficiency, or training time.

In summary, the APSTRAT instructional model provides for a more effective rearrangement of the elements already present in an ongoing training course without substantial increase in cost. In an attempt to facilitate implementation, the model provides for:

(1) Orientation of instructor personnel without retraining.
(2) Improvement or modification of the model without disrupting operation.
(3) Gradual changeover from an existing training program to the new model without interruption of output.

An overview of the main elements of the model can best be given by viewing the model in full operation. It involves four elements—orientation, learning, job performance, and instruction.

The course is organized around a series of job-performance stations that represent the various duties that must be performed by a person competent in the job. Trainees enter the system in daily classes. At each station an advanced trainee performs all job duties under the supervision of instructor personnel, and a trainee who is a new arrival at the station observes the job-performer in the process of doing the job. In this way the newcomer gains familiarity with the duties he himself will be performing in the future.

After familiarization with the job duties, the trainee spends time learning the skills necessary to perform the job. His instructor during this period is the trainee whose job-performance he observed on his observation day. The period of time allocated to the learning phase is determined by the amount of time required by slower learners to reach mastery. When both trainee and trainee-instructor are convinced that the trainee has mastered the skills necessary to perform a given task, they report to an instructor for a proficiency test. The instructor scores the trainee on his ability to perform the task on the basis of a pass or fail criterion.

If the trainee passes, he then proceeds with the mastering of the next task in the sequence, and this procedure is repeated until he has passed all proficiency checks appropriate to the station. (If he fails any test, he must review and practice until he can pass.) The trainee, having demonstrated his proficiency in the required number of tasks, is scheduled for his job-performance day, and an incoming trainee observes his performance, repeating the training cycle with the former trainee assuming the role of peer-instructor.

This entire cycle—observation, learning, job-performance, and instruction—is repeated until the trainee completes the requirements of each station in the curriculum.

This training model, with built-in rigorous quality control, presents a radical change in the approach to performance-oriented training programs. An area of special interest is the effect of role change for both the instructor and the student. The instructor becomes primarily a manager, diagnostician, and one who assumes quality control. The student is both learner and teacher. The dual role has been most effective as a motivator. Testing to date indicates the model works. Our next step is to superimpose an incentive system onto the instructional system and to adapt the instructional system to allow for accelerated graduation.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY *(Corporate author)* Human Resources Research Organization (HumRRO) 300 North Washington Street Alexandria, Virginia 22314	2a. REPORT SECURITY CLASSIFICATION Unclassified 2b. GROUP

3. REPORT TITLE

HumRRO RESEARCH AND PROJECT 100,000

4. DESCRIPTIVE NOTES *(Type of report and inclusive dates)*

Professional Paper

5. AUTHOR(S) *(First name, middle initial, last name)*

Howard H. McFann

6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
December 1970	7	0

8a. CONTRACT OR GRANT NO. DAHC 19-70-C-0012 b. PROJECT NO. c. 2Q062107A712 d.	9a. ORIGINATOR'S REPORT NUMBER(S) Professional Paper 33-70 9b. OTHER REPORT NO.(S) *(Any other numbers that may be assigned this report)*

10. DISTRIBUTION STATEMENT

Approved for public release; distribution unlimited.

11. SUPPLEMENTARY NOTES	12. SPONSORING MILITARY ACTIVITY
Presentation at American Psychological Association convention, Miami Beach, Florida, September 1970	Office, Chief of Research and Development Department of the Army Washington, D.C. 20310

13. ABSTRACT

This paper was part of a symposium in which research on Project 100,000 was summarized. The report presents information on three major HumRRO projects concerned with training and performance of men of varying ability levels. The first project compared on-the-job performance of military personnel of varying ability levels. The second project concentrated on literacy requirements for military jobs. The third project concerned developing and testing, in an operational context, instructional programs appropriate for simultaneously training men of various ability levels.

DD FORM 1 NOV 65 1473

Unclassified

Security Classification

14. KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
Criterion						
Educational Technology						
Individual Differences						
Job Performance						
Literacy						
Training						

ERIC Clearinghouse
MAY 6 1971
on Adult Education